

Massachusetts Institute of Technology
Charles Stark Draper Laboratory

MEMORANDUM

TO: All Apollo Personnel
FROM: Philip Felleman
DATE: 11 February 1971
SUBJECT: Apollo 14 Mission Summary

Apollo 14 was launched on January 31, 1971, at 4:03 EST after a forty minute two second hold for weather. The boost to orbit was nominal and the first IMU alignment agreed with the ground expected values. Trans-lunar insertion was on time and was nominal. The first problem arose during the docking attempt where the capture latches on the probe would not engage the drogue. Docking was achieved on the sixth attempt using a procedure sent up from the ground and on-board investigation of the probe indicated that whatever had caused the capture latches not to work was probably of a transient nature as the probe looked normal. Nevertheless, considerable attention was devoted over the next several days to developing procedures for abnormal undocking and redocking. MIT participated by running simulations assuming that the docking collar, probe and drogue would be with the LM and verified that the additional weight would not penalize the mission.

The first set of P23 cis-lunar navigation exercises established that Roosa marked on an horizon locator of 28 km (his pre-flight predicted value) and his performance was exceptionally consistent. Due to the multiple docking attempts, the RCS fuel was below red line values and the second P23 was cancelled. At about 30 hrs GET, the three accelerometers and the X gyro had compensation updates. This compensation was kept through the remainder of the flight. MCC2 was performed to place the spacecraft on the desired trajectory to arrive at LOI at the correct time and the CMC clock was changed, at about 55 hrs GET, to make GET agree with the flight plan. The update was forty minutes 2.9 seconds. Another item of concern during trans-lunar coast was the status of one of the LM ascent batteries. After much investigation and testing, it was decided that the battery would function properly during the required mission phases.

Lunar orbit insertion and descent orbit insertion were nominal burns. During LM activation, it was noticed that the abort bit in the LGC was set. After realizing that no other indication of the switch being closed was present, the crew was asked to reset the switch. This removed the input to the LGC but it subsequently reappeared. It could be removed by rapping on the panel adjacent to the switch which led to the belief that a solder ball was loose in that section of the abort switch which provided the LGC signal. A work around procedure was developed which would prevent the presence of the bit from effecting an abort and allow the nominal landing to proceed. Timely action on the part of all MIT personnel involved, both here in Cambridge and in Houston provided an outstanding example of real-time mission support. Everyone should be proud of the part that the Laboratory played in this support.

The lunar landing proceeded on schedule, utilizing the workaround. The landing radar was in the wrong tracking mode which prevented radar data acquisition until the circuit breaker was cycled. This procedure worked and data was acquired at 22000 ft altitude. An update of 2800 ft to the descent target was voiced up from the ground and inserted by the crew and the LM landed within 130 ft of the target. A lunar gravity measurement experiment was performed with the LM IMU after touchdown.

During the lunar surface activities the CM performed photography and landmark tracking using P24, a new program which provides rate aided optics to the crew.

LM ascent and rendezvous were nominal with very small midcourse corrections. The docking was nominal and the LM was separated and using an erasable program (P99) was impacted on the moon for a seismic experiment. Trans-earth insertion was nominal and MCC5 was 0.7 fps. There were no further midcourse corrections necessary.

P23 navigation was performed during the trans-earth coast and proved the accuracy of on-board navigation.

The entry sequence went nominally and the best estimate at this time of position error is .7 n mi.

I want to compliment all Apollo personnel on the high quality of support that the Draper Laboratory gave during Apollo 14, and relay the expressions of thanks given us by MSC flight support and management personnel. All of our efforts were well appreciated and acknowledged and everyone should feel pride in a job well done.